

On page 5, line 5, replace "1" with --4--.

In the Claims:

Please cancel without prejudice Claims 1-55, inclusive, and insert the following new claims: --

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Sub C

56. A carbon foam containing a phase change material in at least some of its pores.

57. The carbon foam of claim 56 wherein said phase change material is selected from the group consisting of water, acetic acid, paraffin wax, germanium, and germanium-silicon.

58. The carbon foam of claim 56 encased to prevent loss of the phase change material when in a non-solid state.

59. The carbon foam of claim 58 wherein said phase change material is selected from the group consisting of water, acetic acid, paraffin wax, germanium, and germanium-silicon.

60. The carbon foam of claim 56 wherein the foam is an essentially graphitic carbon foam having a bulk thermal conductivity greater than about 58 W/m·°K.

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contd

61. The carbon foam of claim 60 having an open cell pore structure.

62. The carbon foam of claim 61 wherein the open cell pore structure is substantially comprised of ellipsoidal pores.

63. The carbon foam of claim 62 characterized by an X-ray diffraction pattern substantially as depicted in Figure 14.

64. The carbon foam of claim 62 characterized by an X-ray diffraction pattern having an average d002 spacing of about 0.336.

65. The carbon foam of claim 58 wherein the foam is an essentially graphitic carbon foam having a bulk thermal conductivity from about 58 W/m·°K to about 106 W/m·°K.

66. The carbon foam of claim 65 characterized by an X-ray diffraction pattern exhibiting relatively sharp doublet peaks at 2q angles between 40 and 50 degrees.

67. The carbon foam of claim 66 characterized by an open cell pore structure substantially comprised of ellipsoidal pores.

68. The carbon foam of claim 67 further characterized by graphite substantially aligned along the axes of the cell walls.

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69. The carbon foam of claim 56 wherein the foam is an essentially graphitic carbon foam having a specific thermal conductivity greater than about $109 \text{ W} \cdot \text{cm}^3/\text{m} \cdot {}^\circ\text{K} \cdot \text{g}$.

70. The carbon foam of claim 69 characterized by an open cell pore structure substantially comprised of pores whose planar cross-sectional images are substantially circular or elliptical.

sub 71

71. The carbon foam of claim 69 characterized by an X-ray diffraction pattern having an average d_{002} spacing of about 0.336 and exhibiting relatively sharp doublet peaks at 2θ angles between 40 and 50 degrees.

72. The carbon foam of claim 56 wherein the foam is an essentially graphitic carbon foam having a specific thermal conductivity from about $109 \text{ W} \cdot \text{cm}^3/\text{m} \cdot {}^\circ\text{K} \cdot \text{g}$ to about $200 \text{ W} \cdot \text{cm}^3/\text{m} \cdot {}^\circ\text{K} \cdot \text{g}$.

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73. The carbon foam of claim 72 characterized by an X-ray diffraction pattern substantially as depicted in Figure 14.

74. The carbon foam of claim 72 having an open cell structure with graphite aligned along the cell wall axes, said carbon foam being derived from a mesophase pitch.

75. The carbon foam of claim 72 derived from a mesophase pitch.

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76. The carbon foam of claim 56 wherein the foam is an essentially graphitic carbon foam having a specific thermal conductivity greater than copper.

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77. The carbon foam of claim 76 characterized by an open cell pore structure substantially comprised of ellipsoidal pores.

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78. The carbon foam of claim 77 characterized by an X-ray diffraction pattern exhibiting relatively sharp doublet peaks at 2θ angles between 40 and 50 degrees.

79. The carbon foam of claim 78 derived from a mesophase pitch.

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80. The carbon foam of claim 56 wherein the foam is an essentially graphitic carbon foam having a specific thermal conductivity greater than four times that of copper.

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81. The carbon foam of claim 80 characterized by an X-ray diffraction pattern exhibiting relatively sharp doublet peaks at 2q angles between 40 and 50 degrees and an average d002 spacing of about 0.336.

82. The carbon foam of claim 80 characterized by an open cell pore structure substantially comprised of pores whose planar cross-sectional images are substantially circular or elliptical.

83. The carbon foam of claim 82 derived from a mesophase pitch.

84. The carbon foam of claim 83 characterized by an X-ray diffraction pattern substantially as depicted in Figure 14.

85. A temperature control apparatus attached to a spacecraft in an external location, said apparatus comprising an encased carbon foam containing in at least some of its pores a phase change material that will (1) undergo a phase change at a

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temperature induced by solar radiant energy when in space and (2) revert to its former state when not exposed to solar radiant energy when in space.

86. The apparatus of claim 85 wherein said phase change material commences to melt at a temperature induced by said solar radiant energy when in space and freezes when not exposed to solar radiant energy.

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87. The apparatus of claim 85 wherein said spacecraft is a satellite and the phase change material will (1) undergo a phase change at a temperature induced by solar radiant energy when in orbit about the earth and (2) reverts to its former state when no longer exposed to said solar radiant energy.

88. The apparatus of claim 87 wherein said phase change material commences to melt at a temperature induced by said solar radiant energy when in orbit about the earth and freezes when no longer exposed to said solar radiant energy.

89. An apparatus for thawing frozen food comprising an encased carbon foam containing in at least some of its pores a phase change material that freezes at a temperature above 0° C. but is liquid at room temperature.

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90. A temperature control apparatus for aiding in maintaining the temperature of an object in contact therewith below 1800° C. comprising an encased carbon foam containing in at least some of its pores a phase change material that melts at an elevated temperature above about 800° C. but does not vaporize below 1800° C.

91. An apparatus as defined in claim 90 wherein said phase change material melts between about 800° C. and 900° C.

92. An apparatus as defined in claim 90 wherein said phase change material comprises germanium.

93. An apparatus as defined in claim 90 wherein said phase change material comprises germanium-silicon.

94. A temperature control apparatus for aiding in maintaining the temperature of an object in contact therewith below 1200° C. comprising an encased carbon foam containing in at least some of its pores a phase change material that melts at an elevated temperature above about 800° C. but does not vaporize below 1200° C.

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95. An apparatus as defined in claim 94 wherein said phase change material melts between about 800° C. and 900° C.

96. An apparatus as defined in claim 94 wherein said phase change material comprises germanium.

97. An apparatus as defined in claim 94 wherein said phase change material comprises germanium-silicon.

98. The apparatus of claim 89 wherein the carbon foam is an essentially graphitic carbon foam having a bulk thermal conductivity from about 58 W/m·°K to about 106 W/m·°K.

99. The apparatus of claim 98 wherein the carbon foam has an open cell pore structure.

100. The apparatus of claim 99 wherein the carbon foam is derived from a mesophase pitch.

101. The apparatus of claim 100 wherein the open cell pore structure of the carbon foam is substantially comprised of ellipsoidal pores.

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102. The apparatus of claim 101 wherein the carbon foam is characterized by an X-ray diffraction pattern substantially as depicted in Figure 14.

103. The apparatus of claim 99 wherein the carbon foam is characterized by an X-ray diffraction pattern having an average d002 spacing of about 0.336.

104. The apparatus of claim 85 wherein the carbon foam is an essentially graphitic carbon foam having a bulk thermal conductivity greater than about 58 W/m·°K.

105. The apparatus of claim 104 wherein the carbon foam is characterized by an X-ray diffraction pattern exhibiting relatively sharp doublet peaks at 2q angles between 40 and 50 degrees.

106. The apparatus of claim 105 wherein the carbon foam is characterized by an open cell pore structure substantially comprised of ellipsoidal pores.

107. The apparatus of claim 106 wherein the carbon foam is further characterized by graphite substantially aligned along the axes of the cell walls.

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108. The apparatus of claim 89 wherein the carbon foam is an essentially graphitic carbon foam having a specific thermal conductivity greater than copper.

109. The apparatus of claim 108 wherein the carbon foam is characterized by an open cell pore structure substantially comprised of pores whose planar cross-sectional images are substantially circular or elliptical.

110. The apparatus of claim 109 wherein the carbon foam is characterized by an X-ray diffraction pattern having an average d_{002} spacing of about 0.336 and exhibiting relatively sharp doublet peaks at 2θ angles between 40 and 50 degrees.

111. The apparatus of claim 85 wherein the carbon foam is an essentially graphitic carbon foam having a specific thermal conductivity greater than about $109 \text{ W} \cdot \text{cm}^3/\text{m} \cdot {}^\circ\text{K} \cdot \text{g}$.

112. The apparatus of claim 111 wherein the carbon foam is characterized by an X-ray diffraction pattern substantially as depicted in Figure 14.

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113. The apparatus of claim 111 wherein the carbon foam has an open cell structure with graphite aligned along the cell wall axes.

114. The apparatus of claim 113 wherein the carbon foam is derived from a mesophase pitch.

115. The apparatus of claim 111 wherein the carbon foam is derived from a mesophase pitch.

116. The apparatus of claim 89 wherein the carbon foam is an essentially graphitic carbon foam having a specific thermal conductivity greater than four times that of copper.

117. The apparatus of claim 116 wherein the carbon foam is characterized by an open cell pore structure substantially comprised of ellipsoidal pores.

118. The apparatus of claim 117 wherein the carbon foam is characterized by an X-ray diffraction pattern exhibiting relatively sharp doublet peaks at 2θ angles between 40 and 50 degrees.

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119. The apparatus of claim 118 wherein the carbon foam is derived from a mesophase pitch.

120. The apparatus of claim 85 wherein the carbon foam is an essentially graphitic carbon foam having a specific thermal conductivity from about $109 \text{ W} \cdot \text{cm}^3/\text{m} \cdot {}^\circ\text{K} \cdot \text{g}$ to about $200 \text{ W} \cdot \text{cm}^3/\text{m} \cdot {}^\circ\text{K} \cdot \text{g}$.

121. The apparatus of claim 120 wherein the carbon foam is characterized by an X-ray diffraction pattern exhibiting relatively sharp doublet peaks at $2q$ angles between 40 and 50 degrees and an average d_{002} spacing of about 0.336.

122. The apparatus of claim 120 wherein the carbon foam is characterized by an open cell pore structure substantially comprised of pores whose planar cross-sectional images are substantially circular or elliptical.

123. The apparatus of claim 122 wherein the carbon foam derived from a mesophase pitch.

124. The apparatus of claim 123 wherein the carbon foam is characterized by an X-ray diffraction pattern substantially as depicted in Figure 14

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125. The apparatus of claim 89 wherein the carbon foam is a non-oxidatively stabilized, essentially graphitic carbon foam derived from a mesophase pitch, the carbon foam having an open cell structure and a specific thermal conductivity greater than copper.

126. The apparatus of claim 125 wherein the carbon foam has a specific thermal conductivity greater than four times that of copper.

127. The apparatus of claim 125 wherein the carbon foam is characterized by an X-ray diffraction pattern having an average d002 spacing of about 0.336.

128. The carbon foam of claim 56 wherein the carbon foam is a non-oxidatively stabilized, essentially graphitic carbon foam derived from a mesophase pitch, the carbon foam having an open cell structure and a specific thermal conductivity greater than copper.

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129. The carbon foam of claim 128 having a specific thermal conductivity greater than four times that of copper.